



Outboard Motors and Air Quality on the Colorado River



Travel on the Colorado River through Grand Canyon has certainly evolved since James White purportedly drifted through the canyon on a makeshift raft in 1867. Human muscles endure, powering oars, sweeps and paddles. Since the mid- twentieth century, some river runners have used a variety of engines, especially outboard motors. Today, travelers on the Colorado take advantage of oars, paddles, and outboard motors to propel themselves downstream.

Outboard Motors

Outboard motors are used on the Colorado to help steer into rapids and to “make time” through calm stretches of the river. In rough water the motors are pulled from the water to (hopefully) avoid rocks in the channel. The motors are generally small, usually 30 horsepower.

Two- Strokes: Light and Dirty

Two- stroke engines power many outboard motors. These engines are light, relative to the power they produce. Their designation comes from the way fuel is drawn in and exhaust expelled from the ignition cylinder. Unlike four- stroke engines (those

in cars, for example), oil must be added to the two- stroke engine fuel to lubricate the cylinder. Much of this fuel/oil mixture passes through the cylinder unburned, polluting the air and water as the exhaust vents through the propeller.

Four- Strokes: Heavy but Cleaner

Four- stroke engines are more complicated than their two- stroke cousins. These complications add weight. Four- strokes do not require oil in the fuel mix, and they burn their fuel more completely. As a result, four- strokes emit far less air pollution through their exhaust.

Smoke on the Water

Managing use of the Colorado River in the Grand Canyon has always been a “balancing act.” The National Park Service (NPS) is required to preserve and maintain the river corridor in its natural state. At the same time, the NPS must allow use of the corridor, so long as that use does not degrade its resources.

One of those resources is air quality. Magnificent vistas and relatively pristine air make preserving air quality an issue at Grand Canyon. An inventory of air pollution produced within the park in 1993 found outboard motors on the Colorado to be a significant in- park pollution source. Due in part to these findings, the National Park Service and Colorado River outfitters began a voluntary program to

replace the dirty two- stroke engines with cleaner (and quieter) four- stroke engines. The conversion was complete by the 2001 rafting season.

This chart shows the difference between the pollution produced by 30 horsepower engines operated for 60,000 hours at half- throttle (a typical year’s total use). Using 4- stroke engines decreases toxic hydrocarbon emissions by 100 tons (87%) and haze- causing particulates fall by almost 8 tons (99%.) Carbon monoxide increases with the 4- strokes by 107 tons (47%) and nitrogen oxides increase 6 tons (527%). Lower hydrocarbon and particle emissions certainly do not address all the issues raised by outboards, but this is a significant improvement.

